FATIGUE MANAGEMENT

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OVERVIEW

History

Fatigue Chronic

- Acute
- Task induced (cumulative)
- Circadian (jet lag fatigue)

Circadian Rhythm

Military Operations

- Mission planning/scheduling
- ORM
- Countermeasures pre/post deploym
- Stress reduction
- Sleep Hygiene
- Fitness
- Nutrition
- Medications

History

1972-1995 96 Mishaps with fatigue cited as a factor (AF Safety Center)

14 mishaps with fatigue cited as major or causal factor.

WW II - Amphetamines in British and German survival

Help British during Battle of Britain

Falklands - British first to use non-barbiturate during war (Temazepam)

Libya - F-111 crews took 5 mg Dexedrine

Operation DESERT SHEILD/STORM- Dextroamphetamines used extensively.

Kosovo – 85% of allied combat sorties flown at night

Iraqi Freedom -- B2 bombers – Missions 30-40 hours long.

FATIGUE = Military Operations

Weariness due to the need for sleep by inadequate or poor sleep.

Decrease in skilled performance related to duration or repetitive use of that skill, aggravated by

- physical
- physiological
- psychic stress

Military Operations

- Sustained effort
- Physical exertion
- Prolonged vigilance

FATIGUE TYPES

Chronic Fatigue – internally generated impairment

- Psychogenic origin
- Boredom / progressive anxiety
- Cumulative effect
- Maladaptation to stressful situati

Treatment

- Medical and psychiatric methods
- Rest?

Acute Fatigue

Short periods of sleep loss

Acute Fatigue- Muscular- relieved by re

- Prolonged single missions
- Inadequate rest
- Poor physical condition
- Inadequate emotional preparatio
- Excessive in-flight stress

- Symptoms
  - Physical and mental fatigue
  - Skill deterioration
  - Timing errors
  - Increased forgetfulness
  - Willingness to accept lower standards of skill and accuracy

- Treatment
  - Crew duty limits
  - Physical and mental conditioning
  - Surveillance

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Prolonged Missions

Task-induced/operational

Cumulative

Task-induced/operational- Long hours of work or successive periods w/o sleep

- Military operations carried out over a number of days (ANACONDA)
- Loss of efficiency
- Work in taxing environment

Factors-Physiologic and Physiologic

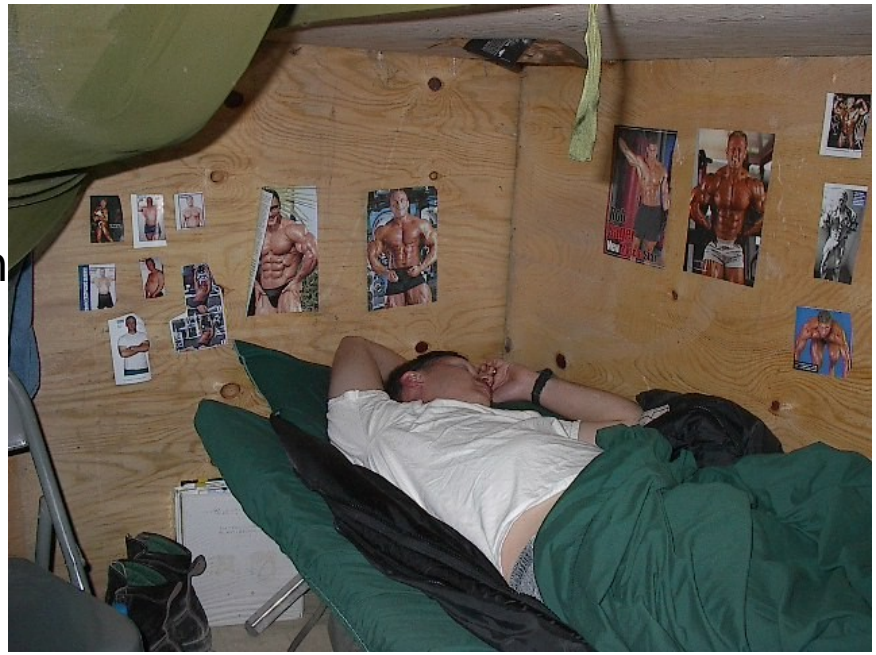
- Repeated similar and stressful flig
- Pilot's attitude towards flights
- Facilities for rest
- Physical condition
- Incomplete mental and physical recuperation between flights

Task-induced/operational

Cumulative

Symptoms –physical and mental tiredness

- Increased sick call visits for minor/insignificant complaints
- Loss of sense of humor
- Apprehension
- Increased drinking
- Irritability
- Appetite loss/ weight loss
- Increased tendency for acciden



Treatment –

- Surveillance and support
- Physical and mental health
- Extended crew duty limits (days, weeks…)
- Adequate rest and recreational facilities
- 2-3 nights sleep

Sleep Facilities

Sleep Facilities

Circadian Rhythm

- Jet Lag Fatigue -- Circadian Desynchronosis -- 3 days to 3 weeks
  - Jet Lag Fatigue
- Physiologic and psychologic effects with time zone change
- Physiologic adjustment slow with change in 4 or more time zones
  - Sleep/awake cycle
  - Food digestion
  - Body temperature
  - Pulse rate
  - Kidney function
  - Hormone levels
  - Mental alertness

- Psychological adjustment rapid
- Requires several days adjustment -- varies greatly with each individual
  - Rotate shift work schedules
  - Strategic Napping
  - Pre-adaptation
  - Timed light exposure

Circadian Rhythm

Single most essential requirement is to obtain planned sleep and rest during the first 24 hours.

- West to East daytime flights to Europe should be followed by a good night's sleep before activities.
- West to East nighttime flight to Europe – morning nap, light afternoon and early bedtime.
- East to West- early to bed and long sleep key
- Returning to home – resynchronizing is usually r
  - Acclimatize
    - Westward 1 day /time zone lost
    - Eastward 1 ½ days per time zone lost

Circadian Rhythm

Travel time formula to calculate rest period

Rest period in tenths of days = To Afghanistan

Travel Time (hours) / 2 18hours/2 = 9

+Time Zone in excess of 4

+12

+Departure time coefficient (local time) +

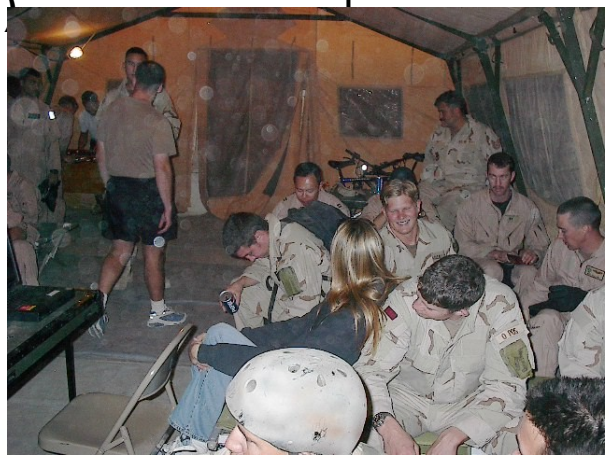
1

+Arrival time coefficient (local time) +

3

25 / 10 = 2.5 round to nearest higher half day = 3 day rest period

Period (hours)	DTC	ATC
0800-1159	0	4
1200-1759	1	2
1800-2159	3	0
2200-0059	4	1



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Sleep Stages

REM- Rapid Eye movement – dreaming 1-5 minute episodes

20% of sleep is REM

NREM

Stage 1 – Non- restorative 1-7 min, light sleep, increased with ETOH

Stage 2 – Restorative 10-25 minutes

Stage 3 – Delta activity, short duration, not effected by circadian activity, May have REM first.

Stage 4 – Deepest sleep 1/3 of night 20-40 minut decreased with age

Cycle repeats 3-6X per night

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Pre/Post Deployment

Mission Planning/ Scheduling

Air Force, Army and Navy – Around the clock operations

Pre Deployment---

Family affairs in order

Training---Don’t double turn aircrew

Training – high risk items early in mission

Train in similar environment

Change in sleep patterns--Convert to night flights prior to deployment

Identify correct sleep times

SLEEP

Pre-adaptation at home –schedule sleep with limited light exposure (ICELAND) 3 days prior

Change watches to destination time prior to travel and sleep at local time

Medications---Give RX prior to deployment

Mission Planning/ Scheduling

Air Force, Army and Navy – Around the clock operations

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Deployment --- Accelerate adaptation to new time zones

Enroute --- Stop over flights enroute

Arrival --- 2-3 days without critical duties

Billeting --- Billet crews together, hard crews/ MX

Scheduling ---

Ensure sufficient amount of rest takes place between duty cycles

Shift schedule forward not back

If accomplish mission, come off ale

3 days on alert – MX recover aircra

Define appropriate recovery times

Standardize shifts / duty schedule

Minimize operations at 2-5 AM

--- Send to K2 no training at K1

Pre-Brief Missions

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NVG Fatigue

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Mission Ergonomics and Fatigue

Deployment Requirements
Troop Movements

Interrupted Rest cycles

ORM

Risk management is key to safety
since sleep and rest patterns are based on requirements of mission.

2. FATIGUE			**TOTAL =**
Sortie Length	Short (0-2.5 hrs)	Normal (>2.5-3.5)	Long (>3.5)
	2	4	6
AC=	CO=	FE=	LS[1]=
Show/Landing Time	0801-1700	1701-2100	2101-0800
Show time <9 hours	0	1	2
Show time <=12 hours	1	2	3
Show time >12 hours	4	3	4
Double Turn/°C-ITS[2]	<32 Normal	<43 Caution	>43 Danger
Double Turning	1	2	3
Overall rest/readiness	☺☺	☺	☹
How alert?	-1	0	1	2
4th + (3rd if night) day of flying in a row			2

ORM

Risk management is key to safety since sleep and rest patterns are based on requirements of mission

66th RESCUE MISSION RISK ASSESSMENT WORKSHEET

Check anticipated risk: _____ Low Risk _____ Low Caution _____ High Caution _____ High Risk

1. MISSION PLANNING			TOTAL =
Tasking/Planning Time	Normal	Compressed	Marginal
No Change	0	1	2
Min Changes	1	2	4
Major Changes	2	4	6

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3. CREW COMPLEMENT				TOTAL =
AC=	CO=	FE=	LS[3]=	
Proficiency/Total Helo time	1000+	500-1000	< 500	
Optimal Proficiency	-2	-1	0	
Average Proficiency	0	1	2	
Minimal Proficiency	2	3	4	
Not current/RAP prob.	3	4	5	
Other Factors				
> 1000 total helo hours, but < 150 H-60 hours				2
Non-local pilot at set of controls				2
AC/IP in command < 50 AC/IP hours				1

[1] Double FE score if no LS, but no less than 0
[2] ITS-Use zone specified by Base Wx, temps listed are approximate
[3] Use a score of "5" if no LS

LEGEND
☺☺ - Very well rested/alert ☺ - Adequately rested/alert 😐 - Somewhat rested/alert ☹ - Marginally rested/alert

4. OPERATING ENVIRONMENT			TOTAL =
Environment/Wx	Good	Fair	Marginal
Flat/Rolling	0	1	2
Mixed	1	2	3
Mountainous	2	4	6
Over water	1	3	6
Night (plus above)	0	3	6
Other Factors			
Density Altitude > 5000 feet			2
Landing at unfamiliar LZ			2
< 10% Power Margin			2
Variable or gusty surface winds > 25 knots			2
Outside Temp < 0°C or > 43°C (ITS Danger)			3
Possible brownout/whiteout conditions			3

5. NVG			TOTAL =
MRMS / EMI	40-100%	10-39%	5-9%
> 4 hrs after/before	-4	-3	-2
> 2 hrs after/before	-3	-2	-1
W/in 2 hrs after/b4	3	2	0
No moon	0		
Other Factors			
Featureless Terrain			2
FLIR Crossover probable during flight			2
No FLIR			3

6. MISSION TYPE	TOTAL =
Choose only the highest	
Live AIE/Jumps	6
NWOPS	5
Tac, AR, EPs, SAR or FCF	4
DWOPS or Cross Country (off local map)	3
Remotes	2

Score / Risk Level	Low Risk	Low Caution	High Caution	High Risk
Total #	0 – 30	31-50	51-65	66+
Approval	A/C	Top 3	SQ/CC/DO	OG/CC
Initials				

7. MISSION COMPLEXITY	TOTAL =
2 Mission types from Sec. 6	2
3 Mission types from Sec. 6	4
> 3 Mission types	6
Formation	2
Instruction/Evaluation	2
Concurrent Instruction	2
Night Mission	7
Hot Refueling	2
WOPS w/ operative AHHS	-2

8. OTHER FACTORS (list)	
Eg: TFM BHM AHC CDTQT Gunnery	

ASSESSED RISK SUMMARY	
1. Mission Planning	
2. Fatigue	
3. Crew Complement	
4. Operating Environment	
5. NVG	
6. Mission Type	
7. Mission Complexity	
8. Other Factors	
TOTAL =	

Stress Reduction

Time off ---pre, post and during deployments

Exercise

Local tours

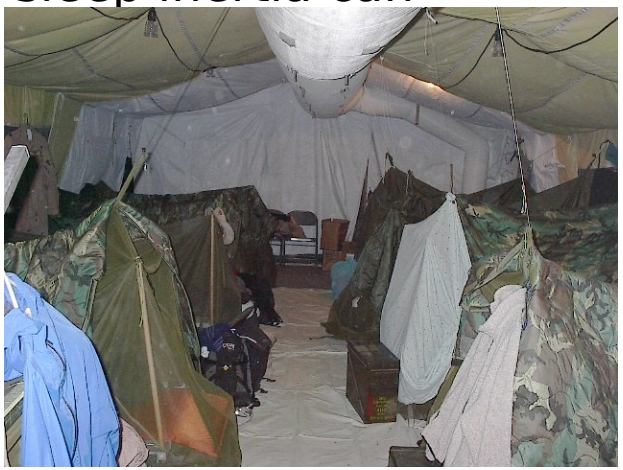
Additional duties

Deployment Items

Pillow/sheets
Food
Ear plugs
Eye cover
Books
DVD’s
CD’s….

Mission Planning/ Scheduling

Sleep--- Nap – increase alertness but caution with sleep inertia can decrease performance 30-45 minutes or mo



Comfortable beds in dedicated sleep area

MX- preflight

Identify correct sleep times

SLEEP

Sleep 8 hours per rest cycle

White noise—ear plugs

Climate

Plan sleep periods -- Alertness and sleep induction

Ensure sufficient amount of rest takes place between duty cycles

Short naps prior to mission

First week observe local daylight patterns

Anchor sleep same time each day at least 4 hours of sleep per cycle

Sleep Hygiene

- Steady daily amounts of exercise (not immediately before retiring)*
- Bedroom Temperatures moderate*
- Avoid chronic use of sleep preparatic
- Light snack before bedtime
- Minimize caffeinated drinks and food
- Minimize or avoid ETOH
- Get up at a regular time*
- Avoid tobacco
- Avoid or limit napping
- Separate sleep and study areas
- Ear plugs
- Avoid excessive amounts of liquid before bedtime
- Get up if you can not fall asleep – no stimulating activity

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Pakistan

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Pakistan

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Kandahar

Kanahar

Kanahar

Kanahar

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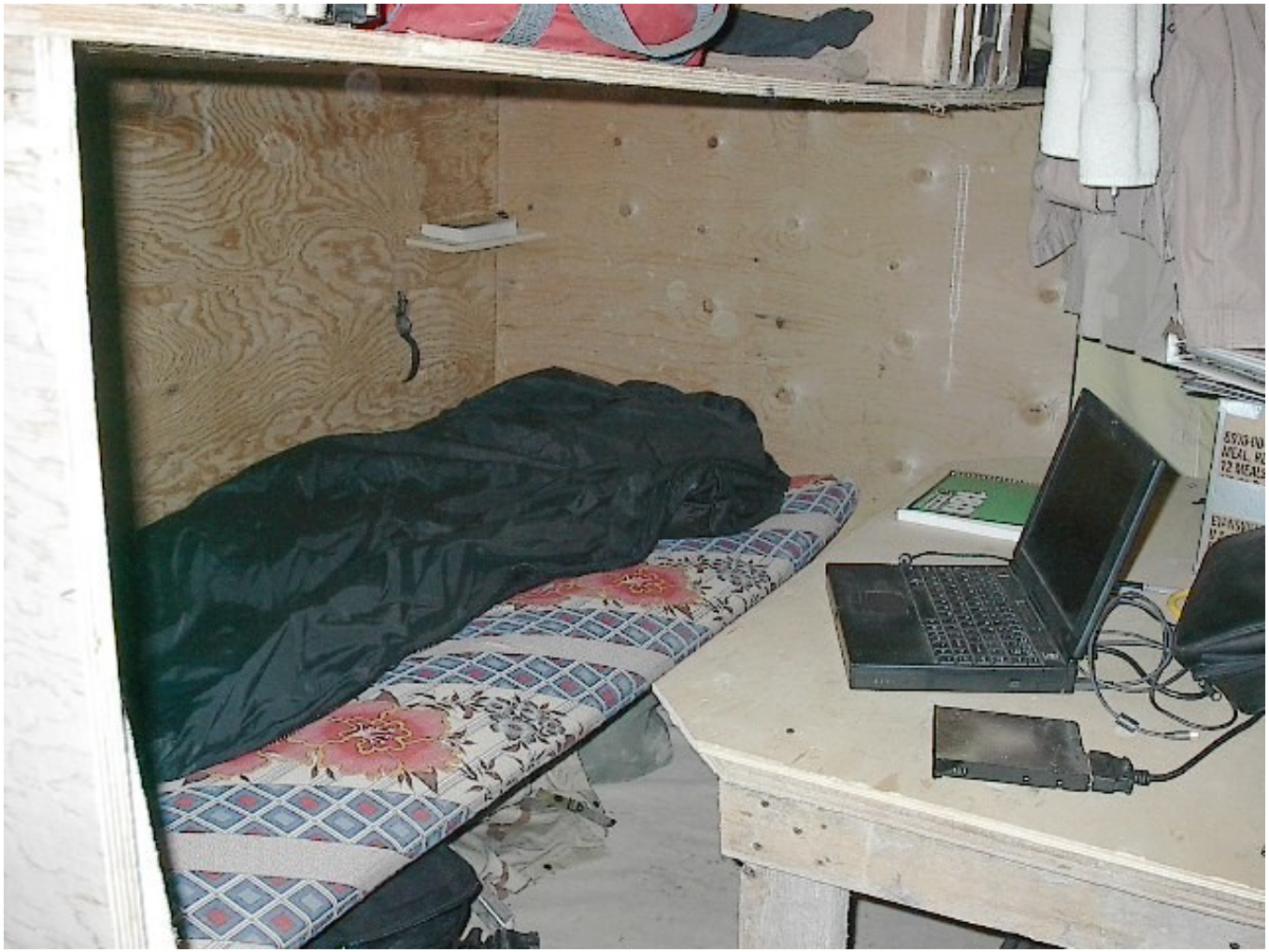
Kanahar

K2 Uzbekistan



Mission planning/ scheduling

Fitness

Diet---

- Avoid stimulants
- Decrease ETOH
- High carbs help sleep but not before
- Minimize caffeine
- MRE’s

Medications---

Not solely pharmacological effort to minimize fatigue.

Nutrition

Balanced diet essential for effective duty performance

Basic caloric intake- ideal weight X 10

Carbs- 1 gram per pound of body weight required to prevent Ketonuria

X 4 cal/gram

Protein- ½ gram per pound of body wei

X 4 cal/gram

Fat- limit total daily fat intake to

< 30% of daily caloric intake

Saturated fat < 10%

Total daily cholesterol intake < 300 mg/

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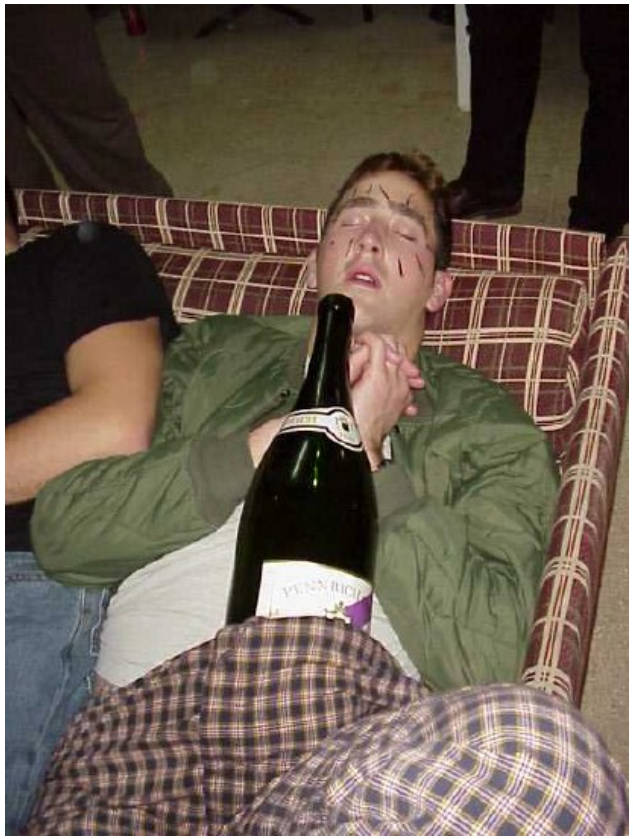
ETOH

Blood Alcohol equivalents

17 hours of wakefulness = BAC 0.05%

24 hours of wakefulness = BAC 0.10%

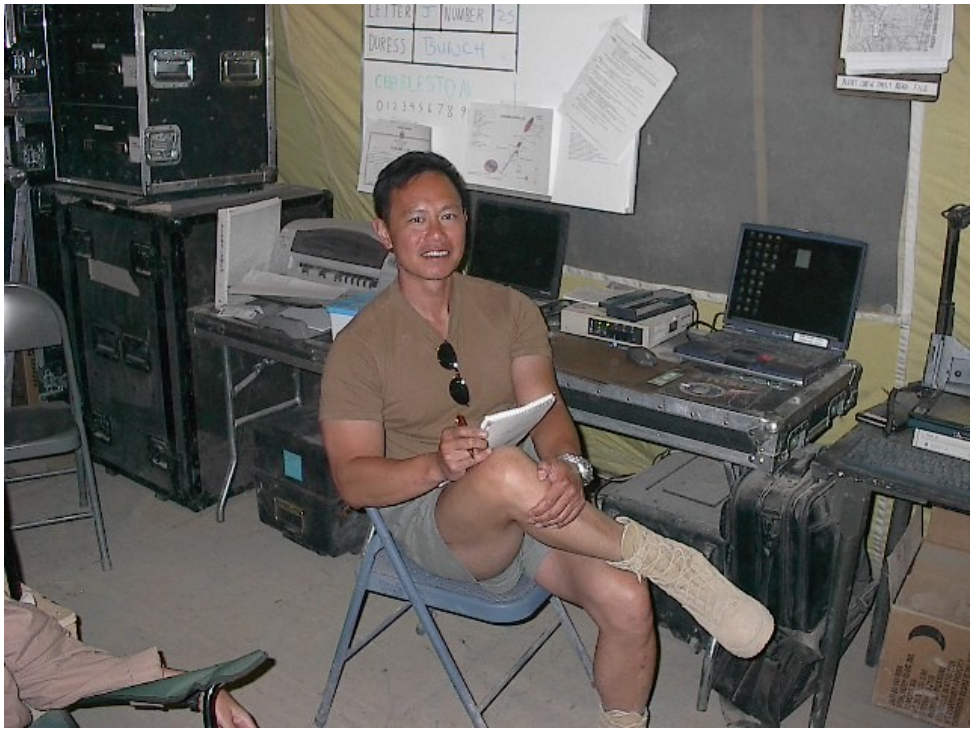


Self Identify Fatigue

RIPE CCC

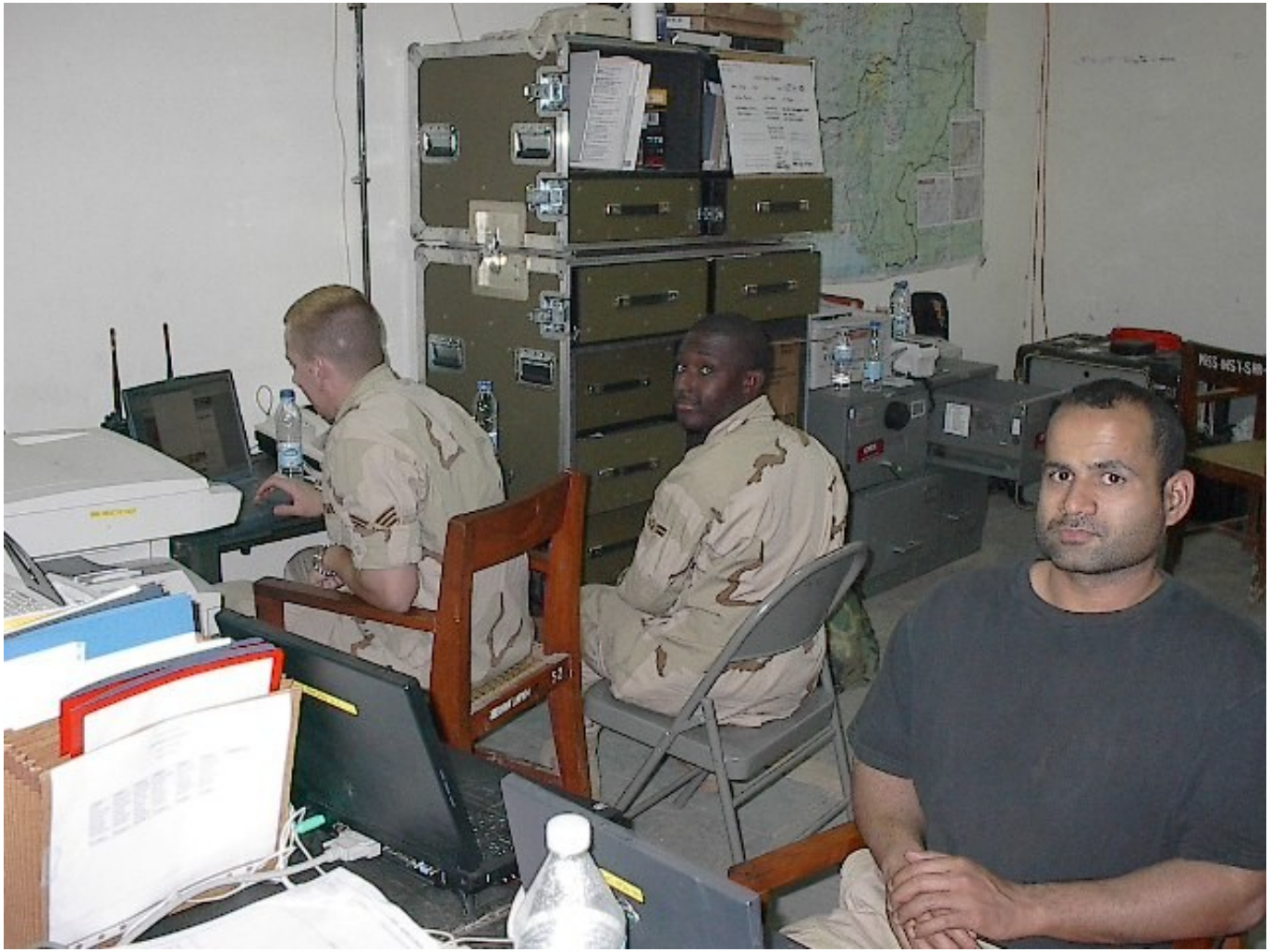
Recognize own symptoms, wingman's, flight leads, maintenance, and support personnel…

R	Reaction Time
I	Irritability
P	Performance
E	Error Rate
C	Calculations
C	Complacency
C	Communications



We are poor judges of our own impairments.

Operation Specialist & Maintenance



Medications

Meletonin

L-tryptophan

Kava-Kava

Tyrosine

Go/ no Go

Ambien, Restoril,
Sonata, benadryl, ….

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Questions?

1. MISSION			TOTAL
Tasking/ Planning	Normal	Compressed	Marginal
No Change	0	1	2
Min Cl	1	2	4
Major Changes	2	4	6

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